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ABSTRACT

Equitable distribution of computer resources is an important concern for school administrators. Computer equity consists of three dimensions: access, participation, and benefits. Access is the number of microcomputers available for student use, or the ratio of students to computers; equity issues arise when access to computers is restricted to certain schools, grade or ability levels, or to certain classes, such as advanced math. Participation is the average amount of computer time allotted to student use; inequities can result if free time usage is dominated by boys or high achieving students. Benefits are the kinds of activities students engage in when using the computer; the assumption that learning to program is preferable to drill and practice or word processing leads to inequities in educational benefits. A list of 12 barriers to equitable computer access and use is included, as well as suggestions for evaluating equity problems. Strategies for solving computer equity problems are suggested, and a list of references completes the document. (JB)

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Computer Equity

by Bonnie Faddis

As our society becomes increasingly "information-oriented," computer skills are fast becoming a basic skill area for the school curriculum. Since computer hardware, quality software and teachers with computer skills are scarce resources in most school districts, how those resources are distributed is an important concern for decision makers.

Although estimates vary as to the percentage of future jobs that will require computer skills, we must ask ourselves which of today's students will be prepared to assume tomorrow's computer-related jobs. Studies have shown that schools in poor areas and predominantly minority schools are less likely to have computers than are suburban schools. Within schools, boys are using computers more than girls are, and there are concerns about the distribution of computers among compensatory education, special education, talented and gifted and average students. Questions about who gets computers in a district and who uses them for what purposes are all questions of equity. This report will examine the various equity issues in computer education, suggest ways in which decision-makers can assess equity in computer learning, and suggest how to correct inequities.

ISSUES

Computer equity can be looked at in three dimensions: access, participation and benefits. Access is simply the number of microcomputers available for student use, or the ratio of students to computers.

Equity issues arise when access to computers is restricted to certain schools in a district, to specific grade or ability levels within a school, or to students enrolled in specific courses such as advanced math.

Participation is the average amount of computer time allotted to student use. Inequities in participation can result if free time usage is dominated by boys to the exclusion of girls or if high-achieving students are allotted more time to use computers than low-achieving students.

Benefits are the kinds of activities students engage in when using the computer. Students who use the computer as a tool for word processing or data analysis are learning different skills than students who use the computer for drill and practice or for writing their own programs. Because it is a higher order skill, it is assumed that learning to program is

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preferable to drill and practice or applications such as word processing. The under-representation of minorities and low-income students in programming classes has raised concerns that they are not receiving certain educational benefits.

Several recent studies have attempted to take a closer look at equity issues in computer learning. Using observations and interviews, researchers at American Institutes for Research (AIR) were able to identify 12 barriers to equitable computer access and use:

- **Lack of encouragement for females and minority students to use computers.** Stereotyped beliefs about what girls should and should not do, lack of parental encouragement, the media, the peer group and the scarcity of effective female and minority role models all contribute to discouraging female and minority students from learning about computers.

- **Potential value of computer learning more apparent to males than females.** Educators should try to identify the interests and needs of their students so all students can see some practical ways to use computer learning.

- **Bias against females and minority students in software and advertising.** Computer magazines and software depict white males as the technology experts and show few women and minority members using computers.

- **Prerequisites irrelevant for computer access and instruction.** If computer time is a reward for finishing other classwork quickly, or if fees are charged for after-school use, low-ability or low-income students may be denied opportunities to use the computer.

- **Limited computer access for females during free time.** If there is a high demand for computer use during free time, boys may be more aggressive about getting time than girls.

- **Underrepresentation of females in computer leadership roles.** Girls may be reluctant to accept positions as tutors or computer lab assistants, or may not even be considered for these roles.

- **Dominance by one student over another during computer time.** When working in partners or groups, some students may monopolize the keyboard while less aggressive students are prevented from getting their fair share of computer time.

- **Pressure from peers not to participate in computer activities.** The desire to be accepted by their friends may conflict with the desire to learn more about computers.

- **Underrepresentation of females and minority students in computer clubs.** These clubs may be unappealing because the activities seem irrelevant, because they conflict with other activities, or because females and minorities simply aren't encouraged to join.

- **Inappropriate location of computers within schools.** Computers in some classrooms may be in constant use, while others are rarely used.

- **Inability of teachers and students to recognize and deal with problems in computer learning.** Because some students are self-conscious about seeking help, teachers may not be able to help with problems.

- **Shortage of qualified personnel for computer learning.** A school may have purchased computer hardware and software, but lack sufficient resources to hire new staff or to train existing staff to use the computers.

Discussion of these 12 barriers, along with suggestions for assessing the extent of the problem and possible solutions are available from AIR in a packet entitled "IDEAS for Equitable Computer Learning" (see ordering information below).

ASSESSMENT

Equity problems in computer education in a school or district can be evaluated through a number of methods. One of the simplest ways to uncover potential problem areas is to interview computer teaching staff and a sample of participating and nonparticipating students. Educators can be asked for their views on the status of equal access and use for all students, and students can be asked about their experiences in using computers at school.

If a larger sample of respondents is desired, a paper and pencil questionnaire would be a more efficient means of gathering information. The AIR packet described above includes a 17-item Student Survey and a 48-item Educator's Self-Assessment.

Observation of computer labs during instructional time and free time use is another powerful tool for evaluating equity. Data can be collected on who is using the computers for what purposes, whether certain groups dominate computer use, whether time is wasted because students must wait too long for help, and so on.

Finally, a number of existing records can be helpful. For example, look at enrollment patterns in computer classes to see if females and minority students are proportionately represented. Examine the software used to see if females and minorities are portrayed and if the software has appeal to different types of students. Check to see if all computer course prerequisites are truly relevant.

Strategies

Once you have identified the specific computer equity issues in your school or building, alternatives for solving the problems should be examined. Some of the more general strategies for ensuring equal access and use would include:

- Formulate a district policy to ensure equitable distribution of computers and learning opportunities.
- Structure free-time use of computers to guarantee opportunities for girls who are often crowded out by more aggressive boys. Certain days or times could be "girls only" or "boys only," or sign-up sheets could designate slots for boys and for girls.
- Encourage students to interact with each other in the computer room, since research has shown that computers have more appeal for many students if their friends are working with computers too.
- Provide software and programming activities that appeal to both boys and girls
- Train teachers to be sensitive to their own biases and to provide additional encouragement to girls and minority students.
- Use bulletin boards to display the variety of computer uses in modern life and to depict computer-related careers, being sure that

men, women and minorities are represented.

- Discuss the goals and activities of the computer curriculum with parents, emphasizing their importance for both boys and girls.
- Incorporate computers into a wide variety of subject areas and classroom activities, such as the school newspaper, recording sales from fund-raising activities, calculating sports statistics, etc.
- Re-evaluate prerequisites for computer classes to eliminate unnecessary requirements that limit student access.
- Locate computers in the school building to ensure maximum access and use by students.
- Encourage students to cooperate in solving their learning problems so that students can receive help as needed.
- Use peer tutors to help with instruction, making sure that boys, girls and minority students are included.

More specific action steps for the 12 barriers to equitable computer learning are contained in the AIR packet described earlier.

Once action is taken to correct inequities, follow-up assessment should be conducted to see if the desired changes have taken place. A quality computer education program attends to equity considerations as an ongoing process so that all students are provided with the learning opportunities necessary to succeed in the world of tomorrow.

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